



# Installation- and user manual

## LCS-KD04



**LC-Products B.V.**

tel. +31 (0)88 8111000

fax. +31 (0)88 8111009

email: [info@lc-products.nl](mailto:info@lc-products.nl)

website: [www.lc-products.nl](http://www.lc-products.nl)

# Content

<b>1 Introduction.....</b>	<b>3</b>
1.1 Operation LCS-KD04 unit.....	3
1.2 Connecting LCS units.....	3
1.3 Communication.....	3
<b>2 User interface.....</b>	<b>4</b>
2.1 Display & Key .....	5
2.2 LED indicators.....	6
<b>3 Installation LCS-KD04.....</b>	<b>7</b>
3.1 Tools and materials.....	7
3.2 Connection points of the LCS-KD04.....	7
3.2.1 Power.....	8
3.2.2 Contrast.....	8
3.2.3 Connecting sensors.....	8
3.2.4 Additional modules.....	11
3.2.5 Use of the potential free contacts to related relais.....	12
3.3 Relais output functions.....	13
3.4 Combine multiple LCS-KD04 units to 1 system.....	15
3.4.1 Wired connection to a PC/laptop.....	15
3.4.2 Use of a virtual com port.....	15
<b>4 LCS Configuration software.....</b>	<b>16</b>
4.1 LCS Configuration.....	16
4.1.1 Application.....	16
4.1.2 RS232 connection.....	17
4.2 Main screen.....	18
4.3 Settings and information.....	19
4.3.1 Tank/sensor number.....	19
4.3.2 Tank settings/dimensions.....	19
4.3.3 Sensor type & multi relais functionality (MR).....	21
4.3.4 Sensor parameters.....	22
4.3.5 Alarm settings.....	24
4.3.6 General.....	24
4.3.7 LCS Modem settings (system settings).....	25
4.3.8 Modem connection.....	26
4.3.9 Actual information.....	26
4.3.10 Actual barometer info.....	27
4.4 Tank overview.....	27
<b>5 Technical specifications LCS-KD04.....</b>	<b>31</b>
5.1 LCS-KD04.....	31
5.2 Configuration software.....	31
5.3 Extra hardware.....	31
<b>6 Declaration of confirmation.....</b>	<b>32</b>

## 1 Introduction

LCS-KD04 is an advanced and accurate system to measure fluid heights in storagetanks. The system can exist out of multiple units and every unit can accept a maximum of 4 sensors each.

This manual is based on the firmware version 3.07, servicenumber 16 and LCS Configurator version 4.09, Servicenumber 16. New functionality is not mentioned in this manual.

### 1.1 Operation LCS-KD04 unit

The main functions of the waTch LCS-KD04 unit are:

- Monitor the fluid height (due several different sensors)
- Switch on/off external equipment by relais
- Generate alarms

If an alarm is actuated (level, defect sensor, etc.) the unit can generate an alarm so the user is warned about the situation.

### 1.2 Connecting LCS units

A maximum of 16 LCS-KD04 units can be connected together, to monitor 64 tanks. In section 3.4 is explained the procedure how to connect LCS-KD04 units into 1 total system.

### 1.3 Communication

Each unit can be connected to a pc. Directly by using the RS232 or serial connector, or wireless by using a modem.



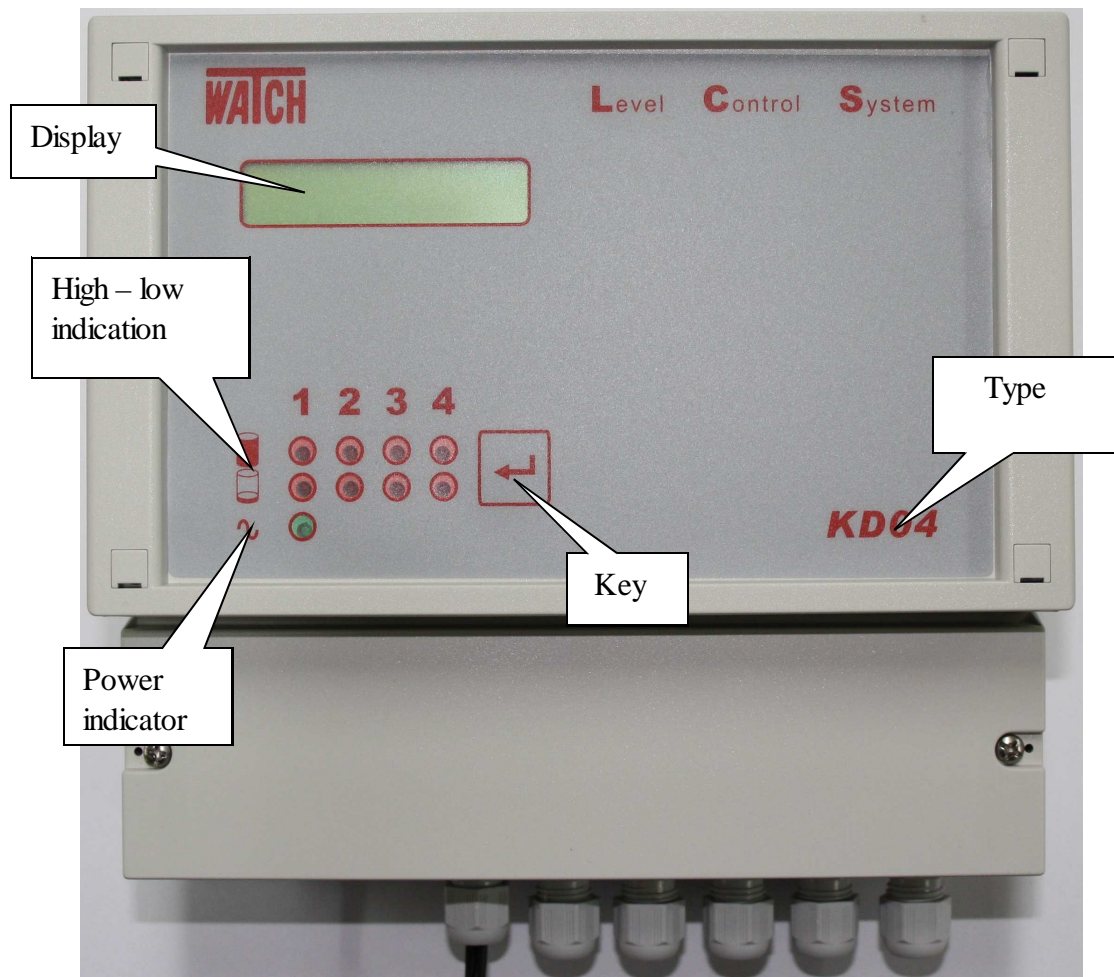
**If multiple units are connected, they all must be connected to the master unit nr.1. The other units can be readressed with LCS Adress configuration tool. Unit 2 will get Adress nr.2, unit 3 will get Adress nr.3, etc.**



**Wireless connection by modem must be done by using an *analogue modem* (GSM or GPRS).**

## 2 User interface

This chapter will describe the user interface of the LCS-KD04.



**Picture 1: LCS-KD04 frontview**

## 2.1 Display & Key



The display shows information about the tankcontent off the (connected) tanks en de relais positions.

1. In standard mode the actual information (content in %, temperature in °C or switch position) is shown for all 4 tanks in once. Behind the sensornumber the relais position is shown.  
– = relais closed, / = relais open.

**1 - 0%      2 / 18°C**  
**3 - 100%    4 / \_ / \_**

2. By pressing the key information of the next group of 4 sensors is shown (if present, sensor 5,6,7,8). The relais position is not mentioned in this mode. Only the : sign so you know it's information of the next LCS-KD04 unit connected in the system.

**5: 9%      6: 89%**  
**7: 99%    8: 43%**

3. By double click the key, more detailed information is provided of tank 1 (tanknumber, relais position, content in litres, content in %, alarm if set and fluid height in mm). Press again the key to show the same information for tank 2, etc. After tank 4 the unit will go back to the original mode.

**1 -      13 L   0%**  
**LOW      5mm**

4. Using the double click for the next 4 tanks will display the same information as mentioned in step 3. Instead of the relais position you see : so you know you have information of an other LCS-KD04 in the system.

**5 :      120 L   9%**  
**70 mm**

5. When the LCS-KD04 is equipped with a modem, you can press the key till you see the information of the provider and the signal strength. The \* sign will pop up if there is connection by modem with the unit. Repressing the key or a time lap of 1 minute is enough to go back to the standard mode setting.

**KPN      \***  
**92**

When an alarm level is reached (high- or low level) the buzzer can go off if set. Pressing the key will stop the buzzer.

## 2.2 LED indicators

The LCS-KD04 is provided with 9 led indicators.

### Power (green led):

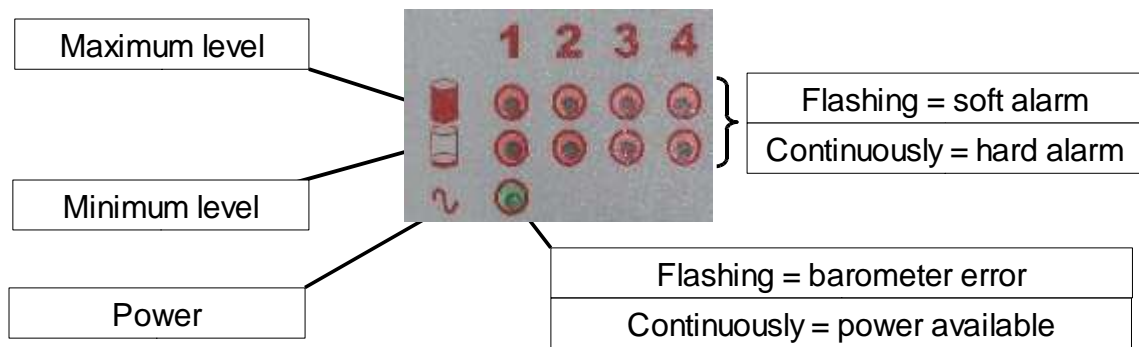
When power is available the green led is shining. A flashing green led means the barometer is in error.

### Level indication (red leds):

Every tank can be configured with minimum and maximum levels (soft-alarm and hard-alarm values).

When a setted soft-alarm (prewarning) value is reached, the red led will flash. Lower led is minimum level, upper led is maximum level.

When a setted hard-alarm (warning) value is reached, the red led will shine continuously. Lower led is minimum and upper led is maximum level.



**Drawing 1: determination leds**



**When both red leds are flashing a sensor error is indicated. Sensor is defect or incorrect connected.**

### 3 Installation LCS-KD04

This chapter will describe the installation of the LCS-KD04. Also building a system out of multiple units is mentioned and how to connect a sensor to a unit.

#### 3.1 Tools and materials

For using a LCS-KD04 you need at least the following materials and software:

- Sensor
- Probe
- Configuration software with RS232 cable

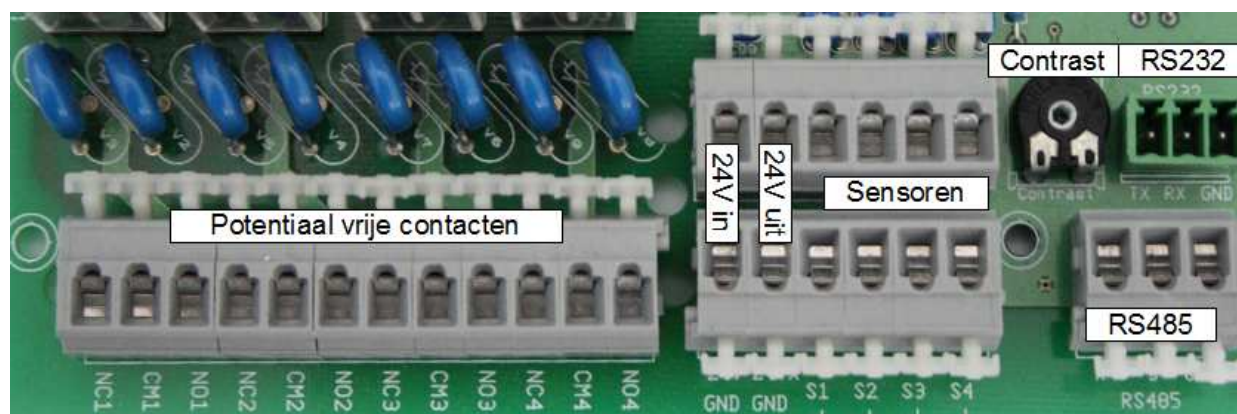
#### 3.2 Connection points of the LCS-KD04

Removing the access cover (picture 2) will reveal all connection points.

A sticker inside the access cover is showing important information. See below the schematic details:



**Picture 2: access cover**



1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	----	----	----

- |                      |                       |
|----------------------|-----------------------|
| 1 = relais T1 NClose | 7 = relais T3 NClose  |
| 2 = relais T1 comm   | 8 = relais T3 comm    |
| 3 = relais T1 NOpen  | 9 = relais T3 NOpen   |
| 4 = relais T2 NClose | 10 = relais T4 Nclose |
| 5 = relais T2 comm   | 11 = relais T4 comm   |
| 6 = relais T2 NOpen  | 12 = relais T4 NOpen  |

+	+	+	+	+	+
-	-	-	-	-	-
1	2	3	4	5	6

- |               |
|---------------|
| 1 = power in  |
| 2 = power uit |
| 3 = sensor T1 |
| 4 = sensor T2 |
| 5 = sensor T3 |
| 6 = sensor T4 |

1	2	3
---	---	---

PC RS 232

- |         |
|---------|
| 1 = TX  |
| 2 = RX  |
| 3 = GND |

1	2	3
---	---	---

RS 485

- |           |
|-----------|
| 1 = 485 A |
| 2 = 485 B |
| 3 = GND   |

**Picture 3: connection scheme**





**Make sure the LCS-KD04 is powerless before connecting sensors or other equipment. So remove the adapter from the power supply before making a connection.**

### 3.2.1 Power

The LCS-KD04 is powered by an adapter 230VAC/24VDC. This adapter is supplied with the LCS-KD04. The adapter is connected to the 24V/GND connector.

### 3.2.2 Contrast

Turning the potentiometer ("contrast" picture 3) will adjust the contrast of the display.

### 3.2.3 Connecting sensors

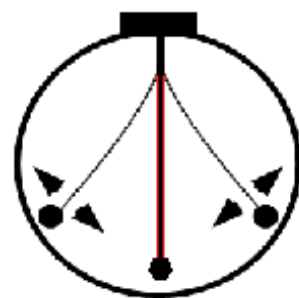
You can connect 4 sensors per LCS-KD04 unit.

The following type of sensors can be connected:

- Analogue pressure sensor: measuring the content level due pressure
- Digital pressure sensor: measuring the content level due pressure (digital interface is needed)
- Vacuum sensor: measuring the vacuum (gap between outer shell-inner shell of tank or piping)
- Ultrasonic sensor: measuring level fluid due sound waves
- Floatswitch: switch contact on a set level
- Analogue temperature sensor: measuring the temperature, as an extra protection of your installation
- Digital temperature sensor: measuring temperature (digital interface is needed)
- Capacitive sensor: measuring fluid levels based on fluid contact to the tube



**Pressure sensors must always be fixated due a probe supplied by LC-Products. Without this probe no guarantee is granted.**





## Explanation of different sensor types:

### 3.2.3.1 No sensor

Sensor type	Led status	Description
No sensor	Deactivated	No sensor is connected

### 3.2.3.2 Analogue pressure sensor

Sensor type	Led status	Description
Relative pressure 4..20mA	Activated while alarm	Relative analogue pressure sensor
Absolute pressure 4..20mA	Activated while alarm	Absolute analogue pressure sensor
Absolute pressure 4..20mA comp->volume	Activated while alarm	Absolute analogue pressure sensor. Measuring compensating volume of other absolute analogue pressure sensor
Absolute pressure 4-20mA comp->pressure	Activated while alarm	Absolute analogue pressure sensor. Measuring compensating pressure of other absolute analogue pressure sensor

### 3.2.3.3 Digital pressure sensor

Digital sensors must be connected to a RS485 sensor interface, see paragraph 3.2.4.2 . RS485 sensor interface (partnumber 5.14.006).

Sensor type	Led status	Description
Keller Serie30 pressure (rs485#1) comp->volume	Activated while alarm	Absolute digital pressure sensor, connected to #1 of the RS485 sensor interface. Measuring also for compensating volume of other absolute digital pressure sensor
Keller Serie30 pressure (rs485#1) comp-> pressure	Activated while alarm	Absolute digital pressure sensor, connected to #1 of the RS485 sensor interface. Measuring also for compensating pressure of other absolute digital pressure sensor
Keller Serie30 pressure (rs485#2) comp->volume	Activated while alarm	Absolute digital pressure sensor, connected to #2 of the RS485 sensor interface. Measuring also for compensating volume of other absolute digital pressure sensor
Keller Serie30 pressure (rs485#2) comp-> pressure	Activated while alarm	Absolute digital pressure sensor, connected to #2 of the RS485 sensor interface. Measuring also for compensating pressure of other absolute digital pressure sensor

### 3.2.3.4 Vacuumsensor

Sensor type	Led status	Description
Vacuum 4..20mA	Activated while alarm	Analogue sensor for vacuum measuring, leakage detection

### 3.2.3.5 Ultrasonic sensor

Sensor type	Led status	Description
Ultrasonic 4-20mA (max..min)	Activated while alarm	Ultrasonic sensor with 4-20mA output. 4mA = maximum beam, 20mA is minimum beam
Ultrasonic 4-20mA (min..max)	Activated while alarm	Ultrasonic sensor with 4-20mA output. 4mA = minimum beam, 20mA is maximum beam

### 3.2.3.6 Switch

#### Remark:

If a switch is used, only one level can be detected. If a second level detection is needed than you have to connect a second switch to a second connection.

Sensor type	Led status	Description
Switch Normally Open → Relais	Activated while alarm	Floatswitch, type normally open. With this setting an equal relais function is activated
Switch Normally Closed → Relais	Activated while alarm	Floatswitch, type normally closed. With this setting an equal relais function is activated
Switch Normally Open → Alarm	Activated while alarm	Floatswitch, type normally open. With this setting only the alarm is activated
Switch Normally Closed → Alarm	Activated while alarm	Floatswitch, type normally closed. With this setting only the alarm is activated

### 3.2.3.7 Temperature sensor

Sensor type	Led status	Description
Temp 4..20mA	Activated while alarm	Analogue temperature sensor 4-20mA. Equal to PT100 sensor. PT100 interface is needed. (Paragraph: 3.2.4.1 : PT100 interface).
Keller Serie30 temp. (rs485#1)	Activated while alarm	Digital temperature sensor type Keller, connected to #1 of the RS485 sensor interface (see digital pressure sensors)
Keller Serie30 temp. (rs485#2)	Activated while alarm	Digital temperature sensor type Keller, connected to #2 of the RS485 sensor interface (see digital pressure sensors)

### 3.2.3.8 Capacitive sensor

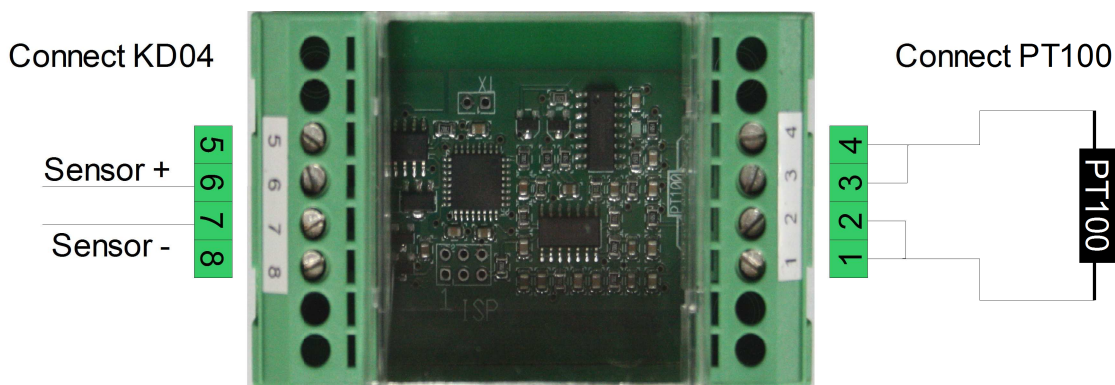
Sensor type	Led status	Description
Capacitive sensor 4-20mA (mn..mx)	Activated while alarm	Capacitive sensor with 4-20mA output. 4mA = minimum , 20mA is maximum

## 3.2.4 Additional modules

### 3.2.4.1 PT100 interface

For using a PT100 sensor, a PT100 interface is needed. This interface can be ordered at LC-Products (partnumber: 5.01.014 "Interface for temperature sensor PT-100").

See picture 4 how to connect the PT100 sensor to a convertor:



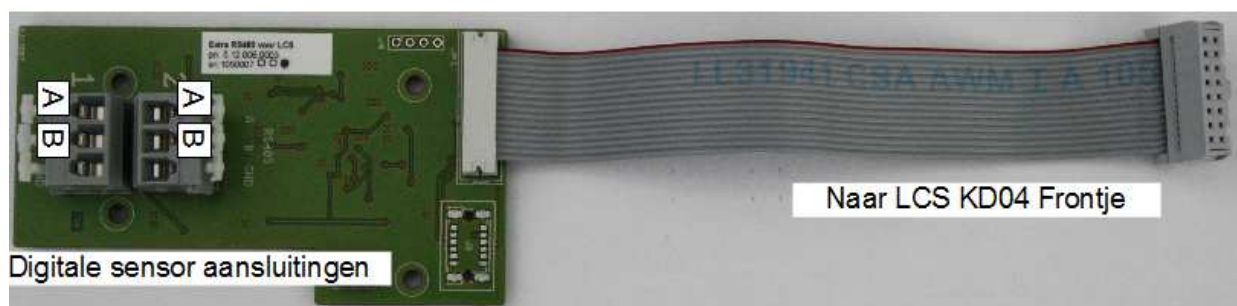
**Picture 4: PT100 interface**

There are multiple kinds of PT100 sensors available, all with different connections. Picture 4 is showing the type with 2 connections.

- A PT100 sensor with 3 wires is to be connected so that the wires with the same colour are connected to 1&2. The other wire is to connect to 3&4.
- A PT100 sensor with 4 wires is to be connected so that the wires with the same colour are connected to 1&2. the other wires with the same colour connect to 3&4.

### 3.2.4.2 RS485 sensor interface (partnumber 5.14.006)

Digital sensors can be connected to the LCS-KD04 by using a RS485 sensor interface. This interface has a flat cable which fits to the controller unit (below the front panel). The RS485 interface can only be mounted in a LCS-KD04 with unitadress 2 or higher and without a modem. If your LCS-KD04 has a modem, please use a second LCS-KD04 to connect the digital sensors and interface.



**Picture 5: waTch LCS RS485 sensor interface**

Picture 5 shows a RS485 interface. Two connectors (input #1 & input #2) for digital sensors, with 3 contactpoints: A, B and ground. A&B is used for data communication. GND is not used.

Mount the interface according picture 6.



**Picture 6: Mounting position interface into LCS-KD04**

### 3.2.5 Use of the potential free contacts to related relais

Every tank (sensor) input has 1 related relais output. This potential free output can be used in 2 different ways: normally open (NO) or normally closed (NC). (see the scheme according picture 3: connection scheme)

Attention: the standard relais position is when the unit is powerless. Equal to an alarmlevel is reached (high or low level, depending on set relais function).

A more detailed description of relais functions is mentioned in paragraph 3.3.

The alarm levels and the relais functions can be configured with our configuration software (see chapter 4).

### 3.3 Relais output functions



**If the LCS-KD04 is off power, the relais is switched to normally closed.**

The relais functions can be configured in multiple settings:

#### Off:

Relais is not activated, standard in NC position.

Max. Volume Alarm Hard	200	liter
Min. Volume Alarm Hard	100	liter
Relais functie	<div> AAN: tussen min. en max. <div> <div>UIT</div> <div>AAN: tussen min. en max.</div> <div>AAN: hoger max. UIT: lager min.</div> <div>AAN: lager min. UIT: hoger max.</div> <div>Overvulbeveiliging Afsluiter</div> <div>Overvulbeveiliging Pomp (afgewerkte olie)</div> </div> </div>	
Max. Volume	AAN: tussen min. en max.	
Min. Volume	AAN: hoger max. UIT: lager min.	

**Afbeelding 7: Relais functie LCS Configurator**

#### On: between min. and max. (AAN: tussen min. en max.)

The tank is configured with one of the optional sensors.

The related output (tank 1 = relais 1, etc) will switch as follows:

Measured level is inbetween the minimum and maximum hard alarm level, the relais switches to NO.

Measured level is below the minimum hard alarm level, the relais is switched to NC.

Measured level is above the maximum hard alarm level, the relais is switched to NC.

#### On: above max. Off: below min. (AAN: hoger max. UIT: lager min.)

The tank is configured with one of the optional sensors.

The related output (tank 1 = relais 1, etc) will switch as follows:

Measured level is above the maximum hard alarm level, the relais is switched to NO.

Measured level is below the minimum hard alarm level, the relais is switched to NC.

#### On: below min. Off: above max. (AAN: Lager min, UIT: hoger max.)

The tank is configured with one of the optional sensors.

The related output (tank 1 = relais 1, etc) will switch as follows:

Measured level is below the minimum hard alarm level, the relais is switched to NO.

Measured level is above the maximum hard alarm level, the relais is switched to NC.



**The valve of the overfill protection must be connected in such a way that the valve is closed when the relais is in NC position.**



**The alarm levels, configured with our LCS Configuration software (see paragraph 4.3.5), are only used to activate the buzzer, send a sms by modem, etc. The relais function will not be defined by these levels. In case of the overfill protection function the relais functions are strictly defined.**

*Special:* **Overfill protection valve (Overvulbeveiliging afsluiter)**

- When the unit is off power, the relais is switched to NC (and the valve is closed)
- When the sensor is defect, the relais is switched automatically to NC (and the valve is closed)
- When the measured level is less than 95%, the relais is switched to NO
- When the measured level is more than 95%, the next cycle will start:
  - Relais will switch to NC (valve closed)
  - After 30 seconds the relais will switch to NO (valve open)
  - After 140 seconds the relais will switch to NC again (valve closed)
  - Relais remains in the NC position till the measured content is below 80%. Than relais will switch to NO (valve open)

*Special:* **Overfill protection pump (Overvulbeveiliging pomp (afgewerkte olie))**

- When the units is off power, the relais is switched to NC (and the valve is closed)
- When the sensor is defect, the relais is switched automatically to NC (and the valve is closed)
- When the measured level is less than 95%, the relais is switched to NO
- When the measured level is more than 95%, the next cycle will start:
  - Relais will switch to NC (pump off)
  - Relais remains in the NC position till the measured level is below 80%. Than relais will switch to NO (pump on)



**Above mentioned switch levels and cycle times are different in the LCS-KD04 KIWA overfill protection unit. For these setting see our manual LCS-KD04 KIWA.**

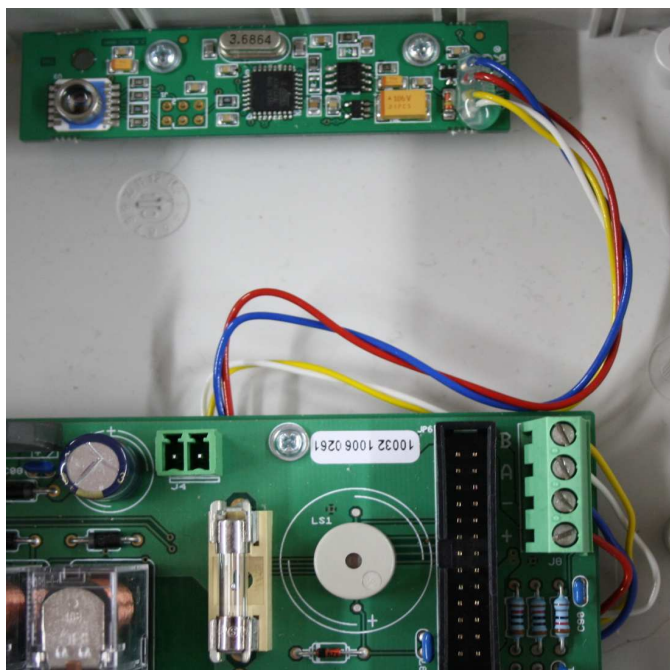
### 3.4 Combine multiple LCS-KD04 units to 1 system

In total 16 LCS-KD04 units can be combined to 1 system. Communication of all data is through the master LCS-KD04 (always unit 1). Data is available from a distance by serial or modem connection.

LCS-KD04 units can be connected together by using the RS485 connector. Connect the A-pole of the 1<sup>st</sup> unit to the A-pole of the 2<sup>nd</sup> unit. Also connect the B-pole of the 1<sup>st</sup> unit to the B-pole of the 2<sup>nd</sup> unit. The ground (GND) is not used.

Every unit has to have a unique unit number before realizing the physical connection. The unit numbers can be set by using LCS Address config-software. Also only unit 1 can have an active barometer. Therefore you have to disconnect the barometers from unit 2,3,4, etc. to avoid conflicts. This can be done by disconnecting the wires from the controllerboard. The LCS Address software is available on our website: [www.lc-products.nl](http://www.lc-products.nl)

After installing the software on your computer you can make a connection with the unit by using the RS232 interface cable. In the software you select: change unit address, for making connection press "connect". The unit address number and also the firmware version- / product number will pop up. This unit address number can be changed from 1-16. After clicking "enter" the new address number is saved in the LCS-KD04.



**Picture 8: Barometer**

After clicking "enter" the new address number is saved in the LCS-KD04.

#### 3.4.1 Wired connection to a PC/laptop

A wired connection between PC/laptop and LCS-KD04 can be realized by using the RS232 connector. You need to use a special cable (partnumber 6.04.009).

When the PC/laptop has no serial entry, then use an additional RS232-USB converter (partnumber N0.00.020).

#### 3.4.2 Use of a virtual com port

LC-Products delivers also RS232-TCP/IP converters, for serial communication with your local network. (ethernet, TCP/IP). Doing this virtual com-ports will be created on the PC. For more details please check our Installation manual of the Nport (partnumber 9.06.006: waTch TCP/IP module).

To use this converter you connect it to a standard computer cable from your local network.

Between the TCP/IP converter and the LCS-KD04 unit you can use the RS232 cable. (see paragraph 3.4.1).



## 4 LCS Configuration software

This chapter is explaining how the unit must be configured. The configuration software is available on our website [www.lc-products.nl](http://www.lc-products.nl).


### 4.1 LCS Configuration

#### 4.1.1 Application

LCS configurator software is available on our website: [www.lc-products.nl](http://www.lc-products.nl). Software is self-installing and ready for use. After starting the application the tank overview will pop up of all 64 tanks/sensors.



**Picture 9: Overview tanks LCS-configurator**

Double clicking on a tank or on the icon  you will enter the configuration page to adjust the tankparameters. (see paragraph: 4.2)

## 4.1.2 RS232 connection

Effectuate a connection with the LCS-KD04. Either a direct connection (RS232) or by modem. The connector on the PCA (printed circuit assembly) is marked with a label "RS232" (see paragraph 3.2 picture 3: connection scheme).

To ensure a correct coupling, the related com-port is to be set in the LCS configuration software.

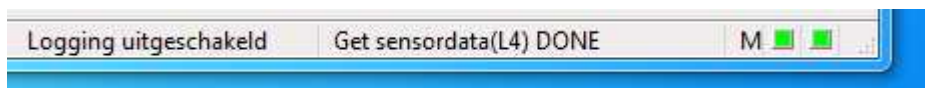
- Select <configuration> and than <settings>
- Select <communication>
- Select the correct com-port to be used



**Picture 10: LCS configuration–communication settings**

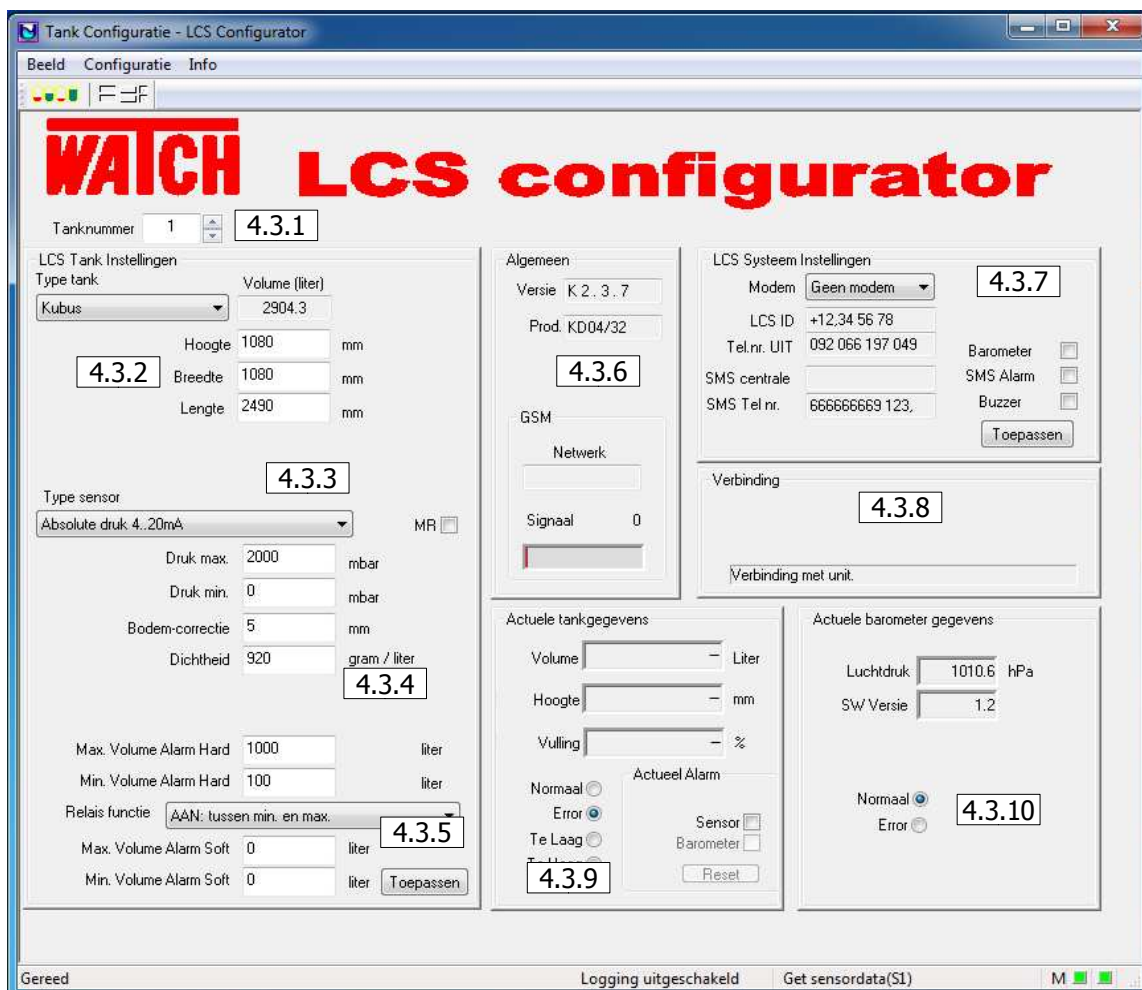
To achieve a modem-connection click the box "use modem". A √ will appear. How to fill in the cellphone number of the M2M simcard is explained in paragraph 4.3.8 .

In the right bottom corner 2 squares are visible. The right square refers to the com-port setting and the left square to the connection with the unit. If the squares turn from red into green you have online connection with the LCS-KD04 unit.



**Picture 11: Status connection**

## 4.2 Main screen



The screenshot shows the 'Tank Configuratie - LCS Configurator' window. The interface is divided into several sections:

- Top Bar:** 'Beeld Configuratie Info' tabs and a language selector (NL, EN, FR).
- Header:** 'WATCH LCS configurator' logo.
- Tanknummer:** A dropdown menu showing '1' and a text field '4.3.1'.
- LCS Tank Instellingen:**
  - Type tank: 'Kubus' (dropdown).
  - Volume (liter): '2904.3'.
  - Hoogte: '1080' mm.
  - Breedte: '1080' mm.
  - Lengte: '2490' mm.
  - Type sensor: 'Absolute druk 4...20mA' (dropdown).
  - MR: ☐.
  - Druk max.: '2000' mbar.
  - Druk min.: '0' mbar.
  - Bodem-correctie: '5' mm.
  - Dichtheid: '920' gram / liter.
  - Max. Volume Alarm Hard: '1000' liter.
  - Min. Volume Alarm Hard: '100' liter.
  - Relais functie: 'AAN: tussen min. en max.' (dropdown).
  - Max. Volume Alarm Soft: '0' liter.
  - Min. Volume Alarm Soft: '0' liter.
  - Buttons: 'Toepassen'.
- Algemeen:**
  - Versie: 'K 2. 3. 7'.
  - Prod: 'KD04/32'.
  - GSM: ☐.
  - Netwerk: .
  - Signaal: '0'.
- LCS Systeem Instellingen:**
  - Modem: 'Geen modem' (dropdown).
  - LCS ID: '+12.34 56 78'.
  - Tel.nr. UIT: '092 066 197 049'.
  - SMS centrale: .
  - SMS Tel nr.: '666666669 123'.
  - Barometer: ☐.
  - SMS Alarm: ☐.
  - Buzzer: ☐.
  - Buttons: 'Toepassen'.
- Verbinding:**
  - Verbinding met unit: .
- Actuele tankgegevens:**
  - Volume:  Liter.
  - Hoogte:  mm.
  - Vulling:  %.
  - Actueel Alarm:
    - Normaal: ☐.
    - Error: ☒.
    - Te Laag: ☐.
  - Buttons: 'Reset'.
- Actuele barometer gegevens:**
  - Luchtdruk: '1010.6' hPa.
  - SW Versie: '1.2'.
  - Actueel Alarm:
    - Normaal: ☒.
    - Error: ☐.
  - Buttons: 'Reset'.
- Footer:** 'Gereed', 'Logging uitgeschakeld', 'Get sensordata(SI)', 'M', and status icons.

**Picture 12: Configuration screen**

In picture 12 you see 10 numbered fields. In paragraph 4.3 you will find the explanation with more detailed information.

## 4.3 Settings and information

### 4.3.1 Tank/sensor number

In this box you can select the tank/sensor to configure (1 – 64).

Tanknummer

**Picture 13:**  
**Tank/sensor selection**

### 4.3.2 Tank settings/dimensions

Different tank shapes can be configured:

- Vessel (cilindrical vessel, flat bottom)
- Cylinder (horizontal cylinder, flat sides)
- Cube
- Prism
- Horizontal cylinder (convex sides)
- Vertical cylinder (convex sides)
- Truncated cone
- Tank with contentlist: every fluid height refers to content in litres. In between values is based on linear interpolation.

Type tank  Volume (liter)

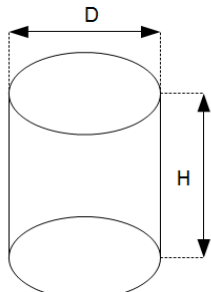
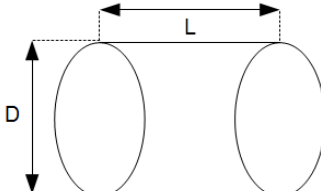
Hoogte  mm

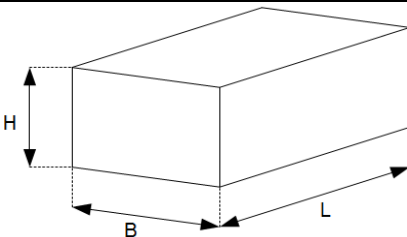
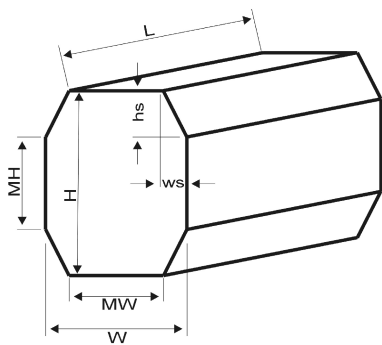
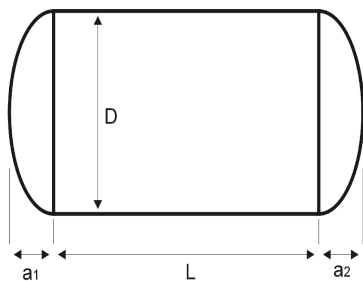
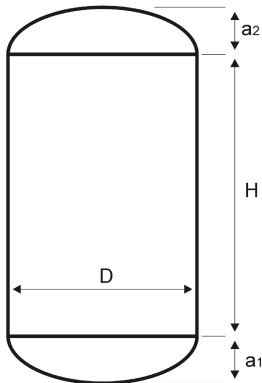
Breedte  mm

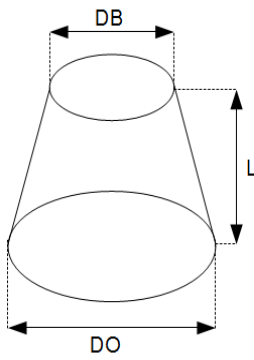
Lengte  mm

**Picture 14: Tank settings**

Per tank shape all necessary dimensions can be set. (for example: high, width, length, diameter, etc).

Type tank	Parameters
Vessel	 <p>D = diameter H = hoogte</p>
Cylinder	 <p>D = diameter L = lengte</p>

Type tank	Parameters
Cube	 <p>H = hoogte B = breedte L = lengte</p>
Prism	 <p>L = lengte H = hoogte MH = midden hoogte MW = midden breedte W = breedte hs = hoogte hoek ws = breedte hoek</p>
Horizontal cylinder with convex sides	 <p>D = diameter L = recht stuk tussen heads a1 = hoogte head links a2 = hoogte head rechts</p>
Vertical cylinder with convex sides	 <p>D = diameter H = recht stuk tussen heads a1 = hoogte head onder a2 = hoogte head boven</p>

Type tank	Parameters
Truncated cone	 <p>DB= diameter boven DO= diameter onder L= lengte</p>
Tank with contentlist	If your tank is different than the standard shapes, you can use a contentlist from the tankproducer. This list can be used in a LCS-KD04 unit. For more detailed information please contact LC-Products B.V.

### 4.3.3 Sensor type & multi relais functionality (MR)

Multiple sensors can be connected to a LCS-KD04 unit:

- 1 Relative or absolute analogue pressure sensors, 4-20mA for content measuring
- 2 Vacuumsensor 4-20mA, for measuring vacuum pressure between outer shell and inner shell of tanks and pipings
- 3 Ultrasonic sensor for content measuring, without fluidcontact
- 4 Temperature sensor
- 5 Floatswitch (normally open or normally closed)
- 6 Digital pressure/temperature sensor (combined)

See paragraph 3.2.3 for detailed info of the sensors. Depending of the type of sensor different parameters can be set.

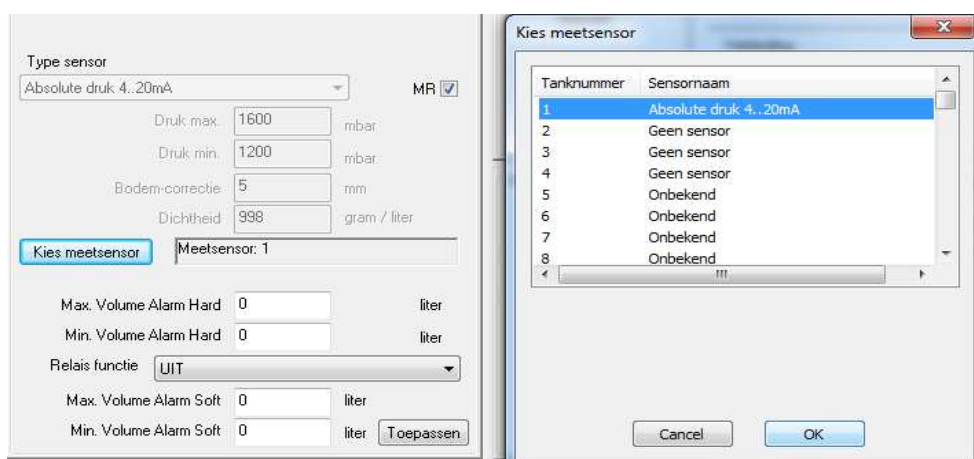
Type sensor  
Absolute druk 4..20mA  
MR ☐

**Picture 15: Type sensor to select**

The multi relais functionality makes it possible to use outputs of different relais combined with 1 sensor. So theoretical you can control 64 relais (hard alarm levels) using only 1 sensor.

Selecting the square MR will activate the multi relais functionality and you can choose the correct reference sensor. It will also deactivate the responding sensor input. So you can use the responding relais (tank 1 = relais 1, tank 2 = relais 2, etc.)and combine it with different sensor input numbers.

To do this you select the button in the pop up <choose sensor> (Kies meetsensor). Now select the sensor you want to use as a reference.



**Picture 16: Multi relais functionality**

The selected sensor will pop up with default settings. You can not alterate it. The relais functionality can be altered in the setting you need, and also the hard- and soft alarm levels can be set.

Activating the multi relais functionality, it will be displayed as relais 2 is connected to sensor 1.

#### 4.3.4 Sensor parameters

Depending of the type of sensor, different parameter fields will appear. The following fields can appear:

**Pressure max. (mbar):** The maximum pressure level of the sensor in mbar

**Pressure min. (mbar):** The minimum pressure level of the sensor in mbar.

**Bottom-correction (mm):** Distance between the sensortip and the bottom in mm millimeters. Sensortip on the bottom = 20 mm.

**Max. hight (mm):** Maximum value pressure of the sensor in millimeters.

**Min. hight (mm):** Minimum value pressure of the sensor in millimeters.

**Span max. (mm):** Distance between bottom of the tank and ultrasonic sensor in millimeters.

**Density (gram/liter):** Density of the fluid in the tank in gram/litre.

**Max. Temperature (°C):** Maximum value of the sensor in degrees Celsius.

**Min. Temperature (°C):** Minimum value of the sensor in degrees Celsius.

**Max. level (%):** Maximum value of the sensor in percentage.

**Min. level (%):** Minimum value of the sensor in percentage.

**Tolerance (%):** Tolerance (margin of error) off the sensor in percentage.

**Choose comp. sensor:** Here you choose a compansation sensor to calculate a absolute value.

Druk max	1600	mbar
Druk min	800	mbar
Bodem-correctie	10	mm
Dichtheid	920	gram / liter

**Picture 17: Sensor parameters (vary per sensor type)**

Check table of the next page for parameter setting per sensor.



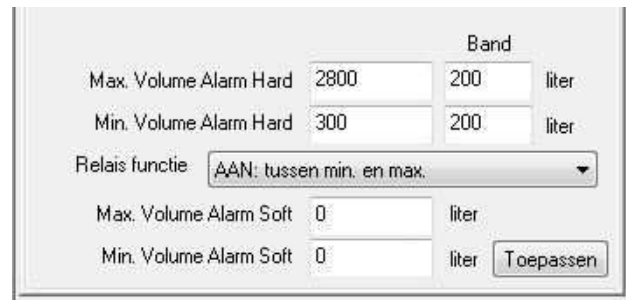
Sensor	Parameters
No sensor	–
Relative pressure 4..20mA	<ul style="list-style-type: none"> <li>– Pressure max</li> <li>– Tolerance</li> <li>– Bottom correction</li> <li>– Density</li> </ul>
Ultrasonic 4-20mA (max..min)	<ul style="list-style-type: none"> <li>– Heigth max.</li> <li>– Height min.</li> <li>– Span max.</li> </ul>
Ultrasonic 4-20mA (min..max)	<ul style="list-style-type: none"> <li>– Heigth max.</li> <li>– Height min.</li> <li>– Span max.</li> </ul>
Absolute pressure 4..20mA	<ul style="list-style-type: none"> <li>– Pressure max.</li> <li>– Pressure min.</li> <li>– Bottom correction</li> <li>– Density</li> </ul>
Absolute pressure 4-20mA comp->volume	<ul style="list-style-type: none"> <li>– Pressure max.</li> <li>– Pressure min.</li> <li>– Bottom correction</li> <li>– Density</li> <li>– Choose compensation sensor</li> </ul>
Absolute pressure 4-20mA comp->pressure	<ul style="list-style-type: none"> <li>– Pressure max.</li> <li>– Pressure min.</li> <li>– Choose comp. sensor</li> </ul>
Temp 4..20mA	<ul style="list-style-type: none"> <li>– Max. Temperature</li> <li>– Min. Temperature</li> </ul>
Keller Serie 30 pressure (RS485#1) comp->volume	<ul style="list-style-type: none"> <li>– Bottom correction</li> <li>– Density</li> <li>– Choose comp. sensor</li> </ul>
Keller Serie 30 pressure (RS485#1) comp->pressure	<ul style="list-style-type: none"> <li>– Choose comp. sensor</li> </ul>
Keller Serie 30 pressure (RS485#2) comp->volume	<ul style="list-style-type: none"> <li>– Bottom correction</li> <li>– Density</li> <li>– Choose comp. sensor</li> </ul>
Keller Serie 30 pressure (RS485#2) comp->pressure	<ul style="list-style-type: none"> <li>– Choose comp. sensor</li> </ul>
Keller Serie 30 temp (RS485#1)	-
Keller Serie 30 temp (RS485#2)	-
Switch Normally Open → Relais	-
Switch Normally Closed → Relais	-
Switch Normally Open → Alarm	-
Switch Normally Closed → Alarm	-
Vacuum 4..20mA	<ul style="list-style-type: none"> <li>– Pressure max.</li> <li>– Pressure min.</li> </ul>
Capacitive sensor 4..20mA (min..max)	<ul style="list-style-type: none"> <li>– Max. heigth</li> <li>– Min. heigth</li> </ul>

## 4.3.5 Alarm settings

2 types of alarm can be set in the LCS-KD04 unit: soft alarm and hard alarm.

The soft alarm is a pre warning (led will flash), meaning that a undesirable situation is coming up (hard alarm).

The hard alarm (led burns continuously) is activating the buzzer if set, or activates the relais or will send a sms by modem.



**Picture 18: alarm settings**

The relais functionality between min. and max. will give a bandwidth (hysteresis) to set. This is an extra boundary before the relais will switch again after the hard alarm triggering. This avoids lapping of the relais.

Below the alarmsetting also the relais function can be selected. See paragraph 3.3 Relais output functions for a more detailed description of all relais functions.



**Attention: the relais will only be activated on the configured hard alarm levels. Exceptions are the temperature sensors. Temperature sensors activate the relais also on the soft alarm levels.**

## 4.3.6 General

In this field information is given about the firmware release and product number. The firmware release exist out of a letter (picture 19: K....) which reflects the type of modem on board. See below table:

	No GPRS	GPRS
No modem	K	k
Modem type 1	L	l
Modem type 2	M	m
Modem type 3	N	n

After the letter a number will follow (picture 19: .. 2.3.7). 2 = to the KD04 (2= KD04, 3= KD04 KIWA). 3.7 = to the firmware release.



**Picture 19: General**

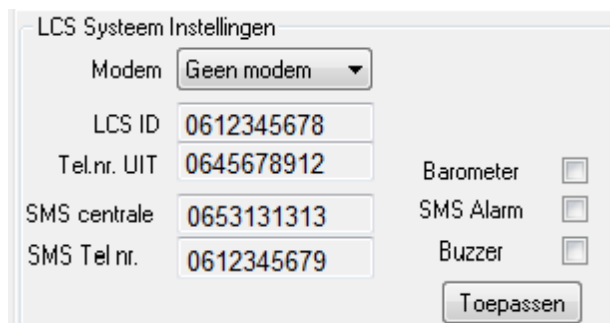
If a GSM/GPRS modem is mounted, and the simcard is placed, information about the provider (name) and the GSM/GPRS signal strength will be shown (0-100%).

### 4.3.7 LCS Modem settings (system settings)

**Modem:** The modem of the LCS-KD04, can be set in 4 modes when the simcard is installed.

- No modem
- Analogue modem
- GSM modem
- GSM/GPRS modem

**LCS ID:** Identification of the LCS-KD04. Normally the cellphone number is used to identify the unit.



**Picture 20: System settings**

**Tel.nr. Out / Server IP:** Telephone number to communicate with when a hard low alarm level is reached. (the LCS-KD04 will make a call to this number). To achieve and receive this call a special application is needed and can be applied by LC-Products. When a data modem is used the IP adress of the server can be added to achieve a communication.

**SMS centrale:** Fill in the cellphone number of the SMS service station of your provider. Without this number SMS messages can not be send when a hard-alarm occurs.

*For your help:*

KPN = +31653131313

Vodafone = +316540881000

T-Mobile = +31624000000

Ben = +31624000000

Telfort = +31626000230

**SMS Tel.nr:** Fill in the cellphone number of the receiver of the sms message.

**Barometer:** The barometer is always activated. When the barometer is defect, a SMS message will be send when this square is selected. (see: 4.3.10 ).

**SMS Alarm:** Selecting this square will send a SMS message when a hard alarm level is reached (see SMS Tel.nr.). When the SMS service station + SMS tel nr are filled in correctly a SMS message will be send, independent if the "SMS" alarm is selected or not, when a **sensor is defect**. The LCS-KD04 will send out this warning for security reasons only.

**Buzzer:** Selecting this square will active the buzzer when a hard alarm level is reached.



**Settings in the LCS-KD04 configurator will be activated and stored after clicking <apply> (Toepassen). The set values will disappear for a short period of time, and than appear again on your screen. All settings are saved now in the LCS-KD04.**

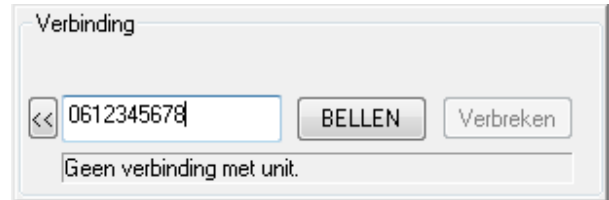


**Attention: for using the GSM modem, always deactivate the PIN code of the GSM/GPRS sim-card!!**

### 4.3.8 Modem connection

Actual information about the connection with the LCS-KD04 is shown. A text will appear when there is a good connection with the LCS-KD04.

For wireless configuration the square "modem" is to be selected in the communication settings. In the config screen fill in the cellphone number of the LCS-KD04. You can also select a cellphone number out of the telephone book (use '<<'). The cellphone numbers are stored in your PC. Not in the LCS-KD04.



**Picture 21: status connection**

The connection will be established after selecting "calling" (BELLEN).

The connection will be disabled after selecting "break" (Verbreken).

### 4.3.9 Actual information

Actual information depends on the selected type of sensor. So the textblock name can change in: actual tankinformation, actual switch positions or actual temperature.

#### **Actual tankinformation**

Indication of the present content in liters, fluid level in mm and content in percentage or pressure in millibar.

#### **Actual switch position**

With switch positions only alarm and errors are shown as: normal, error, to low and to high.

#### **Actual temperature**

Indication of temperature in degrees Celsius

Error and alarm warnings are always visible in this field:

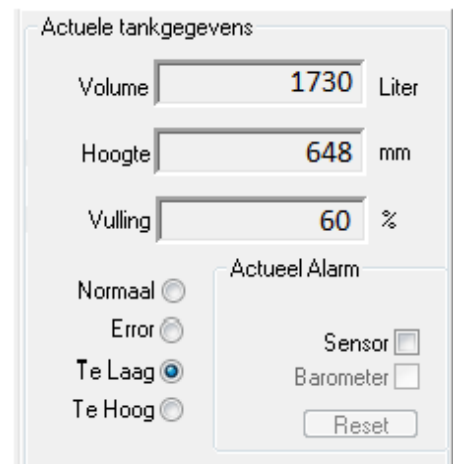
**Normal:** normal level

**Error:** sensor error

**Te low:** level is to low (beneath the hard alarm setting)

**Te high:** level is to high (above the hard alarm setting)

**Actual alarm:** When a sensor or barometer generates an alarm, both can be resetted by clicking the square and press reset.



**Picture 22: actual tankinfo**

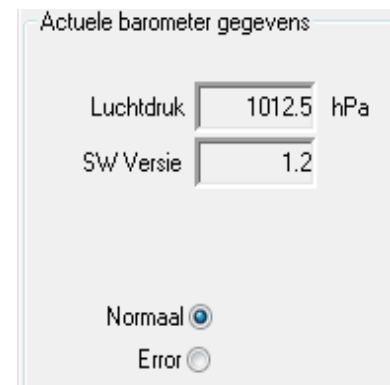
### 4.3.10 Actual barometer info

The barometer will compensate the local airpressure to achieve an accurate measuring.

This box shows the local airpressure and the software release of the barometer. Evenso the use of a relative pressure sensor is possible.


**Normal:** barometer controller is operating correctly.

**Error:** barometer controller is not active or defect. The green power led will flash when this occurs.



**Picture 23: Barometer info**

## 4.4 Tank overview

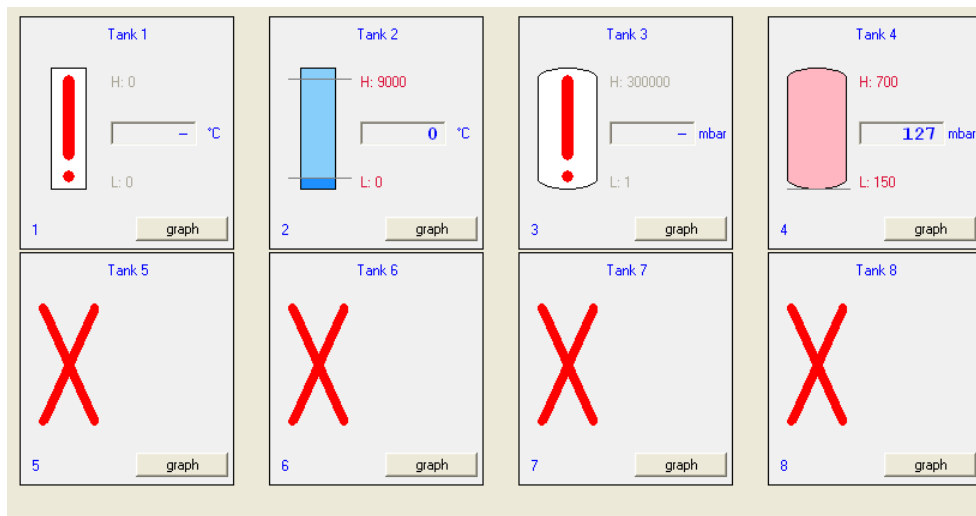
Press  this button and the tank overview screen will start up. This is an overview of all tanks or sensors. Names of tanks can be altered by clicking the right mouse button when you point the cursor on the tank. In the pop up you can change the name.



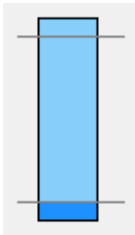
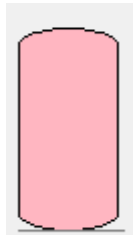


**Picture 24: Select tanks**

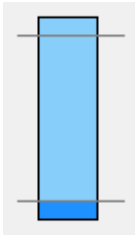
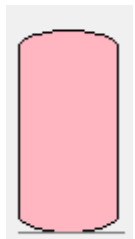


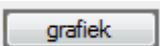
1. Image → Present all tanks: all tanks are tagged and shown.
2. Image → Deselect all: all tanks are de-tagged. Now you can select those tanks you want to view as standard.
3. Image → present all tanks with a tag: Only the tagged tanks will appear.

Extra explanation about the tankoverview in the LCS configurator.



**Picture 25: Tankoverview LCS-configurator**

Symbol	Description
 <p>Horizontal beam</p>	Temperature or pressure value
 <p>Vertical cylindrical tank</p>	Measuring contents
 <p>H: &lt;value&gt;</p>	High alarm level (hard)
 <p>L: &lt;value&gt;</p>	Low alarm level (hard)

 <p>Coloured Blue</p>	<p>Actual value, normal situation</p>
 <p>Coloured Red</p>	<p>Actual value, alarming situation</p>
 <p>Exclamation mark</p>	<p>Sensor error</p>
 <p>Cross</p>	<p>Sensor is not defined or unit of the sensor is not present</p>
	



## Graph

By selecting "graph" an extra program will start up. This program shows a detailed graphic overview of the contents history.

To use this feature you have to create a database.

1. For this go to settings in the LCS Configurator and select a database directory. The frequency of datastacking can be set.
2. Start the program again for actualisation of the settings.
3. Data from the sensors is stacked now in the database.
4. By clicking the "graph" button the stored info is visualised in a graph.

## 5 Technical specifications LCS-KD04

### 5.1 LCS-KD04

- Power LCS-KD04: adapter 230 VAC 50/60Hz in, 24 VDC out, 6 Watt
- Operating temperature: 0-55 °C
- Humidity: 0-90% relative humidity, not condensating
- Inputs:
  - 4-20mA sensor (pressure, temperature, vacuum, ultrasonic)
  - Switch (on/off)
- Accuracy:
  - Analogue pressure sensor and vacuum sensor: 0,5% of the full scale
  - Digital pressure sensor: 0.1% of the full scale
- User interface:
  - 2 red leds for every sensor; flashing means soft alarm, continuously means hard alarm
  - Green led is power indication, flashing means barometer error
  - 2 x 16 characters LCD
- Output:
  - 4x potential free contacts, max. 5A/230VAC; functionality depends on settings
- Outside dimensions: 215 x 210 x 95 mm
- Protection class : IP54

### 5.2 Configuration software

- Min. system requirements: depends on Windows operating system. Pentium-II, minimal 64 Mb RAM, minimal 10 Mb free hard disk space.
- Operating system: Windows 95/98®, Windows NT4®, Windows 2000®, Windows Server 2003®, Windows XP®, Windows VISTA®, Windows 7®.
- PC-link: free RS-232 port, USB-RS232 convertor; for local network a TCP/IP module is used.
- Modem communication: based on a analogue modem. Phoneline or wireless (GSM/GPRS).

### 5.3 Extra hardware

A LCS-KD04 system can be extended with the following modules:

- waTch Extern display: This module shows the fluid height in mm of 1 sensor.
- WaTch Connection box Fuelpos: this module is interfacing with a FuelPos system of Tokheim.
- WaTch Connection box 4-20 mA: this module will generate the fluid height % into a 4-20 mA signal. 4mA = 0%, 20mA = 100%.

For more information about these modules please contact LC-Products or visit our site: [www.lc-products.nl](http://www.lc-products.nl).

	LC-Products B.V.
	Installation- and user manual
	LCS-KD04

## 6 Declaration of confirmation

### Declaration of confirmation 89/392/CEE

Name:	LC-Products BV. Bedrijvenpark Twente 30 7602 KB Almelo Netherlands
Telephone:	+31 (0)88 8111000
Fax:	+31 (0)88 8111009
Email:	info@lc-products.nl

Declares that this product:

Product name:	waTch LCS-KD04
Product number(s):	9.01.033 LCS-KD04 basic unit (equiped with relais and barometer) 9.01.034 LCS-KD04 basis unit (equiped with a GSM/GPRS modem)
Power adapter:	Model GSU15E-6

Is produced according the following standards:

EMC and safety	EN 61000-6-3 (2001) EN 61000-6-2 (2001) EN 61000-3-2 (1995) + A1 (1998) + A2 (1998) EN 61000-3-3 (1995)
----------------	--

We declare with all accountability the product is produced according the directive 89/392/CEE and the subsequent directions.

Almelo, 2012